Etnyre

CHIPSPREADER
OPERATION, MAINTENANCE and
SAFETY MANUAL

⚠️ WARNING
Stay off hopper when machine is in motion. Machine movements could cause a fall resulting in injury or death.

E.D. ETNYRE & CO., Oregon, Illinois 61061
CAUTION

1. Make certain everyone is clear of machine before starting engine or operation.
2. Always use steps, platforms and handrails provided.
3. Remain clear of moving or rotating parts.
4. Always have shields, covers and guards in place when operating.
5. Do not stand in front of hopper to engage and disengage hopper gates.
6. Keep loose clothing away from conveyor area when operating conveyor clutches.
7. Keep drive clutch engaged when machine is being rode down hill.
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INTRODUCTION

Your ETNYRE ChipSpreader is designed to give many years of continuous economic service. The information contained in this manual will enable you to obtain maximum performance from your ChipSpreader.

Ease of operation and application of an even uniform layer of clean dry aggregate a short distance behind a distributor are the main design criteria for the ETNYRE ChipSpreader.

IMPORTANT

1. Front hopper optional segregator screen should be up when unit is traveling between job sites.

2. Keep machine on road or relatively uniform surface at all times.

3. Place truck gear shift in neutral position as soon as truck is connected to the spreader.

4. Under most operating conditions the ChipSpreader should be allowed to tow the truck. However, certain steep up-grade conditions may require the truck to push the spreader with the spreader transmission in neutral position.

5. Never use ChipSpreader to dislodge a truck or other equipment which has become stuck in mud or soft shoulder conditions.

6. Avoid roading machine with material in front hopper.
Check Out

1. The following accessories are with each spreader: grease gun, allen wrench set, extra linkage rods for shortened truck hookup, cushion and seat back, agitator disconnect bolt, wheel lugnut wrench, breaker bar, and various Operator, Parts and Instruction Manuals.

2. Best performance for most operating conditions is achieved when tire pressures are set to 50 P.S.I. in front and 65 P.S.I. in rear. However, various operating speeds, road bed conditions, truck pulling arrangements, and other operating conditions may require different tire pressures.

3. Grease and check oil levels in accordance with the ChipSpreader lubrication chart prior to operation.

4. Check engine water and oil level prior to operation. Refer to Engine Operators Maintenance Manual for complete engine service requirements.

5. Hopper gate adjustment and spread roll straightness are established at the factory. However, to be sure adjustments or straightness were not altered during shipment and storage the following gate and spread roll adjustment checks should be performed prior to operation:

   A. With the hopper removed from the spreader, or the reach rod disconnected, each gate adjusting screw should be set so as to maintain 1/16 inch clearance between the gate and spread roll. At the same time, the gate control lever linkage should be adjusted so the gate control lever just touches the actuator bar stop.

   B. With the hopper attached to the spreader, disengage a 6 inch gate at each end and a 12 inch gate at the hopper center. Engage hopper. Spread roll rotation should not cause disengaged gate levers to move. However, if any gate levers do move, indicating that spread roll is out of round or bent, contact factory for spread roll straightening instructions.

Attaching Hopper to Unit

1. By hooking a lifting device into the rear lifting eye, the hopper can be tilted forward while being raised, allowing the hopper carrying
shafts to engage hopper carrying arms on the spreader. (Figure 1 and 2). Lower hopper slowly until lifting device can be disconnected.

2. Attach lifting device to front lifting attachment and raise hopper to vertical position.
3. Install hopper pins in front of latch arms and through pin catch.
4. Always install latch pin lock keys prior to release of lifting device.

5. Connect hopper drive motor hoses.
6. Attach reach rod.
7. After proper setting of gate adjusting screws and control lever linkages has been established, only then, if necessary, should the reach rod be adjusted to maintain 1/16 inch clearance between gate and spread roll.

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**CAUTION**

1. The ChipSpreader is designed to operate specifically on new sealcoat surfaces therefore reduced braking capability is used to prevent scuffing.

2. On other surfaces, stopping distances must be watched, particularly when towing a truck or going downhill.

3. The larger the truck or steeper the grade the longer the stopping distance.

4. Familiarize yourself with these variables so that you can anticipate when a longer stopping distance is required.

5. In some cases, the truck should assist in stopping.
Standard Unit 2 (Man)

1. To start engine open throttle about 1/4 to 1/3, add choke if necessary, and engage starter switch.

2. Operate spreader with engine at full governed speed.

3. Engage the proper number of hopper gate control levers to obtain the desired spread width. (Figure 3).

4. Select gear ratio from speed chart to obtain desired forward speed. For operators new to the machine it is suggested to start in first gear high range. It should be noted that second gear high-range and third gear low-range offer the two most convenient operating speeds. NOTE: Shift two speed differential (Hi-Lo Range) only while unit is stationary.

5. Set Power gate opener stop to achieve desired application rate using the following steps. (Figure 5).

   A. To set, first loosen gate opener stop lock by turning knob counter-clockwise.

   B. Then slide stop to approximate position that will give desired hopper gate opening.

C. When ready to start operation throw over gate opener lock so gate opener lever is free to move to stop position.
D. Upon beginning operation pull gate opener lever to stop and make final gate adjustment by moving final adjustment lever forward and back as required.

E. Should a piece of foreign material become lodged in the gates, quickly override opener stop by pulling gate opener lever to full open position and allowing piece to pass through gates. Once this has been accomplished return gate opener lever to operational position. This step should be performed as quickly as possible so as to maintain a uniform application rate.

F. When transporting spreader between job sites, lock gate opener in forward position so as to prevent gates from opening accidentally.

6. Adjust spreader hitch height if necessary to accommodate individual trucks.

7. Operate conveyor belt control switches so as to maintain an even distribution of aggregate in front hopper.

8. Conveyor flow deflectors may be used to achieve a desired aggregate distribution in front hopper. (Figure 15).

9. Conveyor hoods will need to be adjusted so as to obtain a uniform distribution of stone in the front hopper. Generally “out” for large stone and “in” for smaller stone.

10. Rear conveyor gates may be adjusted so material is supplied to the front hopper at a rate approximately equal to the rate at which material is being spread. (Figure 6).

11. The operator may wish to disengage the front hopper agitator while spreading clean dry aggregate. This operation is performed by removing the agitator sprocket drive bolt. (Figure 7).

12. Should an electrical system failure occur, the conveyors may be operated by using conveyor control valve emergency override pull buttons until system failure can be located and corrected. (Figure 9).

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FORWARD SPEED CHART

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<tr>
<td>2nd</td>
<td>3.4 M.P.H. = 300 F.P.M.</td>
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<td>3rd</td>
<td>5.7 M.P.H. = 505 F.P.M.</td>
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<tr>
<td>4th</td>
<td>9.3 M.P.H. = 819 F.P.M.</td>
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<tr>
<td>5th</td>
<td>13.8 M.P.H. = 1213 F.P.M.</td>
</tr>
</tbody>
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This chart is based on: 2400 R.P.M. engine speed and 10.00 - 20 tires.

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Figure 6
REAR CONVEYOR GATE
1. Adjustment Bolt

Figure 7
HOPPER CHAIN DRIVE
1. Drive Bolt Holder
2. Agitator Drive Sprocket
3. Sprocket Drive Bolt
OPTIONAL EQUIPMENT OPERATION

Automatic Conveyor Control
On units equipped with automatic conveyor control each belt has a master control switch located in the control panel. The conveyors may be controlled individually by placing the left or right hand conveyor switch in the "automatic," "front," or "drive" position. (Figure 8).

A. By placing the conveyor master control switches in "automatic" position both belts will be automatically started and stopped as necessary to maintain a uniform distribution of material in the front hopper provided conveyor hoods are adjusted properly.

B. With both master switches in "front" position the conveyor control switches located on the front of the right hand conveyor may be used to control each conveyor.

C. The "driver" position allows driver operation of each conveyor from the control panel.

Belt Speed Control
This option allows the operator located on the right front catwalk to vary conveyor belt speed so as to provide a uniform distribution of material to the front hopper. Valves for this operation are incorporated into the conveyor control valves located above the right hand conveyor and are adjusted by turning the appropriate valve control knob, i.e., clockwise for slow and counterclockwise for fast. (Figure 9). This option is particularly helpful when doing shoulder work and operations using less than full hopper width.

Dual Station Control
Dual station control allows for complete control of the ChipSpreader from either the left or right hand side. When the driver is changing from one side of the unit to the other, the following steps should be taken.
A. Engage emergency brake.
B. Place gate opener stop in rear most position on the control opposite the driver's side.
C. Swing control panel to driver's side and lock into position.
D. Locate gate opener stop at desired position on driver's side.
E. Pull easy swing steering wheel to driver's side and engage latch.

Segregator Screen
When the aggregate is not of uniform size the optional front hopper segregator screen may be used to place larger chips on the asphalt ahead of smaller chips and fines. This helps prevent the smaller chips and fines from blotting out the larger material. (Figure 10).

Electric Horn
Optional horn may be used to signal the truck driver of various operations, i.e. disengage truck, starting of a shot, or raise truck dump box.

Extra Agitator
When sand or other small aggregate is being spread, an optional second agitator may be placed in the spread hopper so as to eliminate the possibility of bridging. This agitator should be disengaged when normal sized aggregate are being spread.
ADJUSTMENTS

Rear Hopper Flow Gate Adjustment (Figure 6)
1. Loosen flow gate retaining bolts.
2. Raise gate to increase conveyor flow to front hopper.
3. Lower gate to decrease conveyor flow to front hopper.
4. These gates can be used to provide a more uniform flow of material to the front hopper when different hopper lengths are installed on the machine and when only a portion of hopper length is being used.
5. Retighten flow gate retaining bolts.

Hopper Spread Roll Wear Plate Adjustment (Figure 11)
1. Loosen all spread roll wear plate hold down bolts and adjust the wear plate until a nominal 1/16 inch clearance exists between the wear plate and spread roll for the hopper width.
2. Retighten all hold down bolts.
3. When one side of a plate has worn away, it is possible to turn the plate over and use the opposite side.

Hopper Gate Wear Plate Adjustment (Figures 3 and 4)
1. Loosen wear plate hold down bolts and extend the plate 1/32 inch past the gate edge along the entire gate width.
2. Tighten hold down bolts.
3. As plate wear occurs, additional adjustment will be necessary.
4. When one side of a plate has been worn away, it is possible to turn the plate over and use the opposite side.

Hopper Gate Linkage Adjustment (Figure 3 and 4)
1. Loosen gate adjustment screw jam nuts.
2. With the hopper removed from the spreader or the reach rod disconnected, each gate adjustment screw should be set so as to maintain 1/16 inch clearance between the gate wear plate and spread roll.
3. Tighten gate adjustment screw jam nuts.
4. Adjust the gate linkage length by turning the control lever ball joint connector in or out.

Figure 11
1. Wear Plate
2. Adjustment Slot
3. Adjustment Bolt

Figure 12
1. Reach Rod
2. Jam Nut
3. Ball Joint
4. Control Arm and Shaft
5. Gate Actuator Bar
6. Bar Spacer Block (Insert Shim Here For Adjustment)
until the control lever just touches the actuator bar stop while maintaining the 1/16 inch gate clearance.

Reach Rod Adjustment

1. With the hopper installed on the machine, place Power gate opener control in full closed position. (Figure 5). Operate engine at half throttle when making this adjustment.
2. Loosen reach rod ball joint connector jam nuts.
3. Disconnect reach rod ball joint from gate opener arm on front hopper.
4. Shift gate actuator bar sufficiently to insert a 1/64 inch (.016) spacer between actuator bar and bar spacer block. (Figure 12).
5. Turn the reach rod ball joint connector in or out as required until it fits squarely into the gate opener arm. Remove ball joint from arm and tighten one turn onto reach rod. Reinstall ball joint onto gate opener arm.
6. Remove 1/64 inch (.016) shim and operate hopper control several times. Check for a clearance of .010 to .015 between the gate actuator bar and bar spacer block each time the gates are closed. If clearance is not present, remove ball joint from gate opener arm and turn onto reach rod until clearance is obtained.
7. Tighten ball joint connector jam nut when adjustment is complete.

Conveyor Belt Adjustment

1. If belt tends to move towards one side of the conveyor, tighten tail pulley adjustment on that side until the belt is running in the center.
2. Should it be impossible to obtain centered belt operation by adjusting the tail pulley (Figure 14) it will then be necessary to adjust the head pulley as outlined below. (Figure 15).

For right hand conveyor. (Figure 16).
A. Loosen the four bolts holding the left hand side head pulley bearing.
B. Loosen adjusting bolt jam nuts.
C. Start conveyor belt at this time.
CAUTION: Remain clear of moving parts.
D. If belt runs to the right hand side of the conveyor, loosen adjusting screws until belt is centered on head pulley.
E. If belt runs to the left side of conveyors, tighten adjusting screws until belt is centered on head pulley.
F. Retighten adjusting screw jam nuts.
G. Stop conveyor belt operation at this time.
H. Tighten head pulley bearing bolts.
For left hand conveyors. (Figure 15).
A. Loosen the four bolts holding the right hand side head pulley bearing.
B. Loosen adjusting bolt jam nuts.
C. Start conveyor belt at this time. CAUTION: Remain clear of moving parts.
D. If belt tends to run to the right hand side of the conveyor, tighten adjusting screws until belt is centered on head pulley.
E. If belt runs to the left side of conveyor, loosen adjusting screws until belt is centered on head pulley.
F. Retighten adjusting screw jam nuts.
G. Stop conveyor belt operation at this time.
H. Tighten head pulley bearing bolts.
NOTE: Only a small amount of head pulley adjustment should be necessary to center conveyor belt.

3. Conveyor belts should be sufficiently tight to prevent head pulley slippage when the belts are loaded and operating at full governed speed. It should be noted, however, that excessive belt tightness will result in shortened belt and pulley bearing life. It may be necessary to tighten the belts several times during the first few weeks of operation until most of the initial belt stretch has been removed.

Relief Valve Pressure Adjustment
Before making any relief valve adjustments check to insure there is sufficient oil in hydraulic reservoir and return filter elements are free of contamination.

1. Conveyor control relief valve check. (Figure 16). Conveyor relief valve check should be made with engine operating at 2400 R.P.M.
A. With engine off, remove pressure check tee cap and install necessary adaptors (Anchor Coupling Company adaptor 12F-12JUFS or equivalent and 3/4 inch to 1/4 inch reducing pipe thread bushing. Etnyre P/N 6600943 and 0144033 respectively) in supply line from pump to conveyor control valve being checked. Once adapters are connected, install a 0-3000 P.S.I. pressure gauge in reducing bushing and start engine.
B. Hold (lock) appropriate head pulley with a pipe wrench or other suitable tool. (Figure 17 showing pipe wrench). Use caution when doing this operation.
C. Pressure should be 1500 P.S.I. If relief pressure cannot be obtained remove conveyor control relief valve cartridge and check for contamination or damaged elements. Clean or replace cartridge as required.
NOTE: There are two conveyor control valves, one for the left and one for the right conveyor, located on the top of right hand conveyor.

2. Hopper control relief valve check. (Figure 13). This relief valve should be checked while engine is running at 2400 R.P.M.
   A. With engine off, remove pressure check tee cap and install necessary adaptors (Anchor Coupling Company adaptor 12F-12JUFS or equivalent and 3/4 inch reducing pipe thread bushing. Etnyre P/N 6600943 and 0144033 respectively) in supply line from pump to hopper control valve. Once adaptors are connected, install a 0-3000 P.S.I. pressure gauge in reducing bushing and start engine.
   B. Disconnect hopper motor supply hoses and open front hopper gates. (Figure 20).
   C. This valve has a relief pressure of 1500 P.S.I.
   D. If relief pressure cannot be obtained remove hopper control relief cartridge and check for contamination or damaged cartridge elements. Clean or replace cartridge as required.

3. Power steering and relief valve check.
   This relief valve should be checked while engine is operating at 2400 R.P.M. (full throttle). For this hydraulic circuit, oil first passes through the brake boost valve and then to the power steering control valve. Thus the relief valve is located between brake boost valve and power steering control valve and attached to the inside of the left hand conveyor.
   A. With engine off, remove pressure check tee cap and install necessary adaptors (Anchor Coupling Company adaptor 8F-8JUFS or equivalent and 1/2" to 1/4" reducing pipe thread bushing.)
Etnyre P/N 6600944 and 0116524 respectively) in supply line from pump to power brake boost valve. Once adaptors are connected, install a 0-3000 P.S.I. pressure gauge in reducing bushing and start engine.

B. Turn steering wheel full left or right until wheels are against stops. Hold against stop.

C. With engine running at 2400 R.P.M. the gauge should indicate 1200 ± 100 P.S.I.

D. If relief pressure cannot be obtained, remove steering relief valve cartridge and check for contamination or damaged cartridge elements. Clean or replace cartridge as required.

4. Power gate relief valve check. This relief valve should be checked while engine is running at a 2400 R.P.M. (full throttle).

A. With engine off remove pressure check tee cap and install necessary adaptors (Anchor Coupling Company adaptor 8F-8JUFS or equivalent and 1/2" to 1/4" reducing Pipe thread bushing, ETNYRE P/N 6600944 and 0116524 respectively) in supply line between pump and power gate activator. Next install a 0-3000 P.S.I. pressure gauge in bushing. (Figure 13).

B. Disconnect power gate actuator at pivot arm.

C. Disconnect actuator position linkage at rear of actuator. (Figure 20).

D. Start ChipSpreader engine.

E. Collapse actuator to closed position by pulling on position linkage.

F. This actuator has a relief pressure of 1250 ± 50 P.S.I.

G. If relief pressure is inadequate disassemble power assist actuator and check relief valve for damage and contamination. Clean or replace components as required.
# LUBRICATION

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*On new machines change return line filter elements after first two weeks of operation. After initial change (two weeks) replace elements on an annual basis unless hydraulic system has been worked on and contamination introduced into the system. Change filter elements anytime it is Possible that contamination had been introduced into the system.

**Brake Fluid conforming to DOT 3, DOT 4, DOT 5, or SAE J-1703. Manufactures include Dow Corning and Wagner.
TROUBLE SHOOTING

IF CONVEYOR BELT IS NOT RUNNING IN CENTER OF CONVEYOR:

1. Check conveyor belt adjustment and adjust as indicated in adjustment section of this manual.

IF BRAKES ARE NOT OPERATING PROPERLY:

1. Check brake fluid level in master cylinder.
2. Check brake shoe adjustment.

IF SPREAD ROLL FAILS TO OPERATE WHEN GATES ARE OPENED:

1. Check to insure hopper agitator or spread roll are not jammed with rock left in the front hopper while changing job sites.
2. Check hydraulic oil level and add if necessary.
3. Check hydraulic system return line filters for contamination and replace if necessary. (Figure 21).
4. Check hopper control valve linkage to insure valve Spool is being pulled out when gates are opened and shoved in where gates are closed.
5. Check hopper control valve relief pressure and adjust if necessary per instructions of this manual.
6. Should low pressure persist after replacement and adjustment of the relief valve cartridge, a worn pump or motor may be the cause. To check pump wear, place a hand controlled valve between the hydraulic pump and hopper control valve. With pressure gage in place, close hand valve slowly until 1500 P.S.I. is reached. If this pressure cannot be reached, excessive pump wear is the probable cause for low system pressure.
7. If 1500 P.S.I. pump pressure is obtainable check for hydraulic motor wear by disconnecting the motor return line coupling while system is at 1500 P.S.I. or maximum obtainable pressure and motor is locked. Remove return line coupling. Return flow should not exceed 3 G.P.M. when engine is operating at full governed speed. Excessive return line flow indicates a worn hydraulic motor.

IF CONVEYORS FAIL TO OPERATE:

1. Check fuse panel for blown or shorted fuses. If consistent fuse failure occurs check for shorts in electrical wiring.
2. Check hydraulic oil level and add if necessary.
3. Check hydraulic system suction return line filters for contamination and replace if necessary.
4. Check to insure electrical power is being supplied to conveyor control valves when front control switch is in "ON" position. This may be done with a voltmeter, test light, or by sparking the supply wire against a bare metal area of the ChipSpreader. If latter procedure is used, recheck fuse panel before further checking of electrical system is completed. If power is not available at the conveyor control valves, check to determine if power is available at
valve control switches. If power is available at conveyor control switch but not at valve solenoid, control switch may need replacement. If power is not available at front control switches check control panel wiring for shorts or loose wires.

5. Should electrical supply check satisfactory, operate conveyor control valve emergency override palm button. (Figure 16). IF conveyor then operates, there is a good possibility the conveyor failure was caused by a shorted control valve solenoid.

6. Check conveyor control valve relief pressure per instruction of this manual.

7. Should low pressure persist after replacement of the relief valve cartridge, a worn pump or motor may be the cause. To check for pump wear, place a hand controlled valve in high pressure line from hydraulic pump to appropriate conveyor control valve. With pressure gauge in place, close hand valve slowly until 1500 P.S.I. is reached. If this pressure cannot be reached, excessive pump wear is the probable cause for low system pressure.

8. If 1500 P.S.I. pump pressure is obtainable check for hydraulic motor wear by disconnecting the appropriate motor return line while system is at 1500 P.S.I. or maximum obtainable pressure and motor is locked. On units equipped with belt speed control, set control to full open (FAST) position. Return flow should not exceed 3 G.P.M. when engine is operating at full governed speed. Excess return line flow indicates a worn hydraulic motor.

**IF POWER STEERING IS NOISY OR NOT OPERATING:**

1. Check hydraulic oil level and add if necessary.

2. Check hydraulic system inline return line filters for contamination and replace if necessary.

3. Check power steering relief pressure per instructions of this manual.

4. Check power steering pump wear by placing a hand controlled valve in the supply line from pump to power steering control valve. With pressure gauge in place, close hand valve slowly until 1500 P.S.I. is reached. If this pressure cannot be reached, excessive pump wear is the probable cause for steering system inoperation.

5. If 1500 P.S.I. pump pressure is obtainable, check for steering control valve wear by disconnecting the pump supply line and connecting it directly to one port of steering cylinder with opposite port open to drain. Excessive steering control valve wear is indicated if steering cylinder operates and does not show more than 2 G.P.M. drain, after initial surge of fluid in the steering cylinder has been discharged.

6. Excessive steering cylinder wear or leakage is indicated by a cylinder drain rate greater than 2 G.P.M.

**IF MATERIAL BEING SPREAD FAILS TO FORM EVEN DISTRIBUTION IN FRONT HOPPER:**

1. Check conveyor hood adjustment and adjust if necessary per instructions of this manual.
IF GATE OPENER FAILS TO OPERATE:

1. Check hydraulic oil level and add if necessary.
2. Check hydraulic system inline suction strainer and return line filter for contamination and replace if necessary.
3. Check to insure gate opener is not jammed with rock or other foreign material.
4. Check gate opener relief valve setting and adjust if necessary per instructions of this manual.

OPTIONAL EQUIPMENT

AUTOMATIC CONVEYOR CONTROL

1. Check conveyor operation as outlined under standard unit check list with selector switch in “Front” position.
2. Check to insure electrical power is available at paddle switch when selector switch is in “automatic” position. (Figure 8). If not, check selector switch wiring per wiring diagram, i.e. look for shorts, loose or incorrectly connected wires. Correct selector switch wiring but no power at paddle switch indicates a need to replace selector switch. If power is available at paddle switch but not at solenoid a need to replace the paddle switch is indicated.
3. Check to insure electrical power is available at control panel conveyor switch when selector switch is in “Driver” position. (Figure 8). If not check selector switch wiring per wiring diagram, i.e., look for shorts, loose or incorrectly connected wires. Correct selector switch wiring but no power at panel control switch indicates a need to replace selector switch. If power is available at control panel conveyor switch but not at solenoid, a need to replace the control panel switch is indicated.

IF AGGREGATE TENDS TO BUILD UP BEHIND AUTOMATIC CONVEYOR CONTROL PADDLE AND PREVENTS CONVEYOR FROM SHUTTING OFF AUTOMATICALLY WHEN HOPPER IS FULL:

1. Check conveyor hood adjustment and adjust for better material distribution by sliding hood forward.
2. Check to insure control paddle is not bent forward of a vertical position. If paddle is bent forward, bend to a position slightly rearward of vertical.
3. On units equipped with belt speed control, it may be possible to improve automatic conveyor control operation by slowing the conveyor belt which is delivering material to the side of the hopper which is closed.
4. When a large number of gates are closed on one side of hopper for an extended period of time, it may be necessary to operate the belts manually with the front conveyor belt control switches until spread width is increased.

IF SPEED CONTROL VALVE FAILS TO CHANGE BELT SPEED:

BELT SPEED CONTROL

1. Check to insure engine is being operated at full governed speed when checking belt speed variation.
2. Replace valve if necessary.
1. Trucks ranging in size from four to ten yards are handled easily by an ETNYRE Chip-Spreader.

2. An apron on the rear of each truck will be quite helpful.

3. For truck hitch arrangement, see truck hitch tow bar illustration below.

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**Truck Hitch Tow Bar Illustration**

- **Minimum 2 1/4”**
- **8 1/2” Minimum**
- **20” if Rear Hole Mounted Hitch**
- **16” if Front Hole Mounted Hitch**

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A. 3390451-Cold Rolled Round 1 3/4” dia. x 36” long
B. 3390450-Hot Rolled Flat 1/2” x 4” x 18” long (2) Req’d
### Decimal Equivalent Chart

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### Hydraulic Fitting Code

**Letter Designation**
- **MP** - Male Pipe Thread
- **FL** - "O" Ring Flange
- **FP** - Female Pipe Thread
- **MS** - Male SAE, 45
- **MB** - Male "O" Ring Boss
- **FS** - Female SAE, 45
- **MJ** - Male JIC, 37
- **C** - Compression Fitting (Ferrule Type)
- **FJ** - Female JIC, 37
- **X** - Swivel

**Size**

Size is represented in sixteenths of an inch. One inch equals 16, one half inch equals 0.8.

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**Example:** The description for a "1/2" 90 degree Hydraulic Elbow, Male NPT to Female NPT Swivel, would be as follows:

```
ELBOW-HYDR, 90, 08MP-08FPX
```

- **90 Degrees**
- **Size, 1/2"**
- **Male Pipe Thread**
- **Female Pipe Thread**
- **Size, 1/2"**
- **Swivel**